itself, by the action of its spring, all the paper previously outside the head.

If the weight of this arrangement should prove too much for the micrometer-spring, which ought not to be the case, the recording part may be placed on a separate axle parallel to the micrometer screw, which may be made to turn it by means of toothed wheels.

From the pressure of other matters, much delay has occurred in the introduction of these plans, but Mr. Simms has now applied the arrangement first described to the Greenwich Transit Circle, where it is found to answer very well, and the other will probably be made in a short time.

Blackheath, 1873, *June* 12.

Observations of Occultations of Stars by the Moon, 1872 *and* 1873 (*with the deduced Equations between the Errors of the Lunar Elements*); *and of Phenomena of Jupiter's Satellites, in* 1871 *and* 1873: *made at the Radcliffe Observatory, Oxford.*

(*Communicated by the Radcliffe Observer.*)

Occultations.

No.	Day of Observation.	Phenomenon.	Moon's Limb.	Oxford Mean Solar Time. h m s	Observer.
	1872.				
1	Aug. 12	Dis. of λ Libræ	Dark	9 39 37·7	M
2	Sept. 15	,, τ^1 Aquarii	,,	11 22 44·0	K
3	,,	,, τ^2 Aquarii	,,	12 39 42·4	L
4	,,	Reap. of τ^2 Aquarii	Bright	13 43 27·2	L
5	,, 24	Dis. of ε Geminorum	,,	12 22 36·4	K
6	Oct. 11	,, 35 Capricorni	Dark	10 16 48·9	M
7	,, 14	Reap. of 33 Piscium	Bright	6 48 17·3	K
8	Dec. 9	Dis. of *f* Piscium	Dark	7 12 41·3	K
9	,,	Reap. of *f* Piscium	Bright	8 2 14·9	K
	1873.				
10	Jan. 22	Dis. of 28 Libræ	,,	18 23 50·8	L
11	Apr. 2	,, 118 Tauri S*	Dark	9 3 17·8	M & K
12	,,	,, ,, N*	,,	9 3 24·8	M & K
13	May 8	,, γ^1 Virginis	,,	13 5 8·5	K
14	,,	,, γ^2 Virginis	,,	13 5 21·0	K
15	,,	Reap. of γ^1 Virginis	Bright	14 5 10·0	K
16	,,	,, γ^2 Virginis	,,	14 5 21·9	K

Notes.

1872. Aug. 12. The disappearance was instantaneous and the observation good.

Sept. 15. τ^1 Aquarii (disap.); good.

1872. Sept. 15. τ^2 Aquarii (disap.); good. At the reappearance the star was very faint, owing either to thin cloud or moisture on the object-glass.

,, 24. Good, though both Moon and star were tremulous.

Oct. 11 & 14. Good.

Dec. 9 *f* Piscium (disap.); clouds.

,, ,, (reap.); good.

1873. Apr. 2 Hazy clouds covered the Moon and stars at the time of occultation, so as to efface the Moon's unilluminated disk, which was visible before. The observations are good (M.)

Disap. of 118 *Tauri*, S✱ and N✱; good. (K.) The mean of the observed seconds 17·5 and 18·0 for S✱, and 24·5 and 25·0 for N✱ has been taken.

May 8. For disap. of γ^1 and γ^2 *Virginis*, Mr. Lucas gave $8^s{\cdot}8$ for the disap. of γ^1, and $21^s{\cdot}7$ for disap. of γ^2. Both stars disappeared instantaneously, and the observations are considered good.

The observations of reap., though considered good, are not so certain as those of disap., being probably a little late.

In the following table of the errors of lunar elements resulting from the occultations the Greenwich notation is used, and the elements of the *Nautical Almanac* uncorrected. All the computations have been made by Mr. Main by the method given in his treatise on *Spherical and Practical Astronomy*.

The observations are referred to by the Nos. of reference given above.

$$1 + 6''{\cdot}41 = + 0{\cdot}946 \times e + 0{\cdot}024 \times f - 0{\cdot}946 \times x - 0{\cdot}026 \times y - 0{\cdot}445 \times t + 1{\cdot}590 \times m - 0{\cdot}955 \times n.$$

$$2 + 15{\cdot}83 = + 0{\cdot}959 \times e - 0{\cdot}156 \times f - 0{\cdot}959 \times x + 0{\cdot}155 \times y - 0{\cdot}440 \times t + 0{\cdot}735 \times m - 0{\cdot}990 \times n.$$

$$3 + 13{\cdot}41 = + 0{\cdot}690 \times e - 0{\cdot}705 \times f - 0{\cdot}690 \times x + 0{\cdot}705 \times y - 0{\cdot}476 \times t + 2{\cdot}952 \times m - 0{\cdot}989 \times n.$$

$$4 - 15{\cdot}24 = - 0{\cdot}932 \times e + 0{\cdot}288 \times f + 0{\cdot}932 \times x - 0{\cdot}289 \times y + 0{\cdot}501 \times t - 2{\cdot}310 \times m - 0{\cdot}989 \times n.$$

$$5 - 16{\cdot}01 = + 0{\cdot}871 \times e + 0{\cdot}252 \times f - 0{\cdot}871 \times x - 0{\cdot}250 \times y - 0{\cdot}461 \times t - 2{\cdot}506 \times m - 0{\cdot}893 \times n.$$

$$6 + 0{\cdot}82 = + 0{\cdot}712 \times e + 0{\cdot}648 \times f - 0{\cdot}712 \times x - 0{\cdot}649 \times y - 0{\cdot}204 \times t - 1{\cdot}152 \times m - 0{\cdot}976 \times n.$$

$$7 - 17{\cdot}10 = - 0{\cdot}713 \times e + 0{\cdot}698 \times f + 0{\cdot}713 \times x - 0{\cdot}698 \times y + 0{\cdot}485 \times t - 0{\cdot}756 \times m - 0{\cdot}972 \times n.$$

$$8 + 22{\cdot}62 = + 0{\cdot}103 \times e - 0{\cdot}995 \times f - 0{\cdot}103 \times x + 0{\cdot}995 \times y - 0{\cdot}282 \times t + 2{\cdot}539 \times m - 0{\cdot}945 \times n.$$

9 $-11\cdot81 = -0\cdot979 \times e - 0\cdot193 \times f + 0\cdot979 \times x + 0\cdot192 \times y + 0\cdot291 \times t + 0\cdot441 \times m - 0\cdot944 \times n.$

10 $+4\cdot88 = +0\cdot932 \times e - 0\cdot231 \times f - 0\cdot932 \times x + 0\cdot229 \times y - 0\cdot306 \times t + 0\cdot385 \times m - 0\cdot939 \times n.$

11 $+1\cdot64 = +0\cdot836 \times e - 0\cdot374 \times f - 0\cdot836 \times x + 0\cdot376 \times y - 0\cdot437 \times t + 2\cdot549 \times m - 0\cdot920 \times n.$

12 $0\cdot00 = +0\cdot835 \times e - 0\cdot379 \times f - 0\cdot835 \times x + 0\cdot380 \times y - 0\cdot436 \times t + 2\cdot555 \times m - 0\cdot920 \times n.$

13 $+4\cdot60 = +0\cdot546 \times e + 0\cdot838 \times f - 0\cdot546 \times x - 0\cdot838 \times y - 0\cdot394 \times t - 1\cdot268 \times m - 0\cdot902 \times n.$

14 $+4\cdot70 = +0\cdot542 \times e + 0\cdot838 \times f - 0\cdot542 \times x - 0\cdot838 \times y - 0\cdot392 \times t - 1\cdot275 \times m - 0\cdot902 \times n.$

15 $-1\cdot83 = -0\cdot997 \times e - 0\cdot084 \times f + 0\cdot997 \times x + 0\cdot084 \times y + 0\cdot420 \times t - 1\cdot695 \times m - 0\cdot902 \times n.$

16 $-4\cdot34 = -0\cdot997 \times e - 0\cdot084 \times f + 0\cdot997 \times x + 0\cdot084 \times y + 0\cdot420 \times t - 1\cdot695 \times m - 0\cdot902 \times n.$

Phenomena of Jupiter's Satellites.

Day of Obs. 1871.	Satellite.	Phenomena.	Instrument and Power used.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Feb. 13	III.	Occ. dis. first contact	10-ft. tel. with power 80	8 4 44·3	8 20	K
		,, bisection		8 7 43·8		
		,, last contact		8 10 28·3		
	III.	Occ. reap. bisection	,,	10 48 17·2	11 0	,,
		,, last contact		10 51 46·6		
17	II.	Occ. dis. last contact	,,	7 6 44·1	7 11	L
	I.	Tr. ingr. first contact	,,	11 28 33·0	11 34	,,
		,, last contact		11 34 50·9		
	II.	Ecl. reappearance	,,	12 10 12·2	12 16 37·3	,,
18	I.	Occ. dis. first contact	,,	8 35 2·9	8 45	K
		,, bisection		8 38 2·4		
		,, last contact		8 40 2·1		
	I.	Ecl. reappearance	,,	12 8 59·9	12 14 1·3	,,
20	I.	Ecl. reappearance	,,	6 37 30·1	6 43 1·3	,,
	III.	Oc. dis. first contact	,,	11 57 7·7	12 8	,,
		,, bisection		12 0 22·2		
		,, last contact		12 3 6·8		
Mar. 6	I.	Ecl. reappearance	,,	10 29 17·3	10 34 41·0	,,
22	I.	Ecl. reappearance	,,	8 49 48·3	8 55 14·3	,,

Day of Obs. 1871.	Satellite.	Phenomena.	Instrument and Power used.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Apr. 6	I.	Tr. egr. first app.	Heliom: with power 200	8 43 54·1	8 50	M
		,, bisection		8 45 53·8		
		,, last contact		8 47 8·6		
	II.	Tr. egr. first app.	,,	9 24 17·5	9 34	,,
		,, last contact		9 27 2·1		
1872. Dec. 11	I.	Occ. reap. first app.	Heliom: with power 150	11 39 29·3	11 44	K
		,, bisection		11 42 28·8		
		,, last contact		11 46 28·1		
1873. Jan. 2	I.	Tr. ingr. first contact	10-ft. tel. with power 80	11 53 10·8	12 1	,,
		,, last contact		11 59 39·7		
10	II.	Ecl. disappearance	Heliom: with power 150	10 14 57·1	10 20 3·1	L
	IV.	Ecl. reap. first seen		10 48 56·8	10 54 29·2	,,
		,, full brightness		10 52 32·2		
25	I.	Tr. ingr. first contact	,,	11 36 52·6	11 45	K
		,, bisection		11 40 17·1		
		,, last contact		11 43 21·6		
27	I.	Tr. egr. first app.	,,	8 22 15·8	8 31	,,
		,, bisection		8 25 15·3		
		,, last contact		8 28 44·7		
Feb. 27	II.	Tr. ingr. first contact	,,	8 50 51·5	8 57	,,
		,, bisection		8 53 36·1		
		,, last contact		8 56 35·6		
	II.	Tr. egr. first app.	,,	11 40 23·4	11 49	,,
		,, bisection		11 43 8·0		
		,, last contact		11 46 7·5		
Mar. 5	I.	Tr. egr. first app.	,,	11 28 42·8	11 38	,,
		,, bisection		11 31 7·4		
		,, last contact		11 33 56·9		
8	II.	Ecl. reap. first seen	10-ft. tel. with power 80	9 58 6·1	10 2 53·8	,,
		,, full brightness		10 0 21·2		
13	I.	Occ. dis. first contact	Heliom: with power 150	8 5 9·0	8 11	,,
		,, bisection		8 6 53·7		
		,, last contact		8 8 53·4		
	I.	Ecl. reap. first seen	,,	11 1 15·3	11 6 16·5	,,
		,, full brightness		11 4 9·8		
22	I.	Ecl. reap. first seen	10-ft. tel. with power 80	7 24 16·3	7 29 22·0	,,
		,, full brightness		7 26 26·5		
	II.	Occ. dis. first contact	,,	10 37 25·6	10 47	,,
		,, bisection		10 40 25·1		
		,, last contact		10 43 24·6		

Day of Obs. 1871.	Satellite.	Phenomena.	Instrument and Power used.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Mar. 24	II.	Tr. egr. first app.	10-ft. tel. with power 80	7 41 9·8	7 48	K
		„ bisection		7 43 34·4		
		„ last contact		7 46 38·9		
26	IV.	Tr. egr. first app.	„	9 56 33·1	10 7	„
		„ bisection		10 1 2·4		
		„ last contact		10 6 1·6		
27	I.	Occ. dis. first contact	„	11 36 24·3	11 44	„
		„ bisection		11 38 53·9		
		„ last contact		11 41 13·5		
28	III.	Occ. dis. first contact	„	7 37 21·5	7 46	L
		„ last contact		7 44 31·3		
	I.	Tr. ingr. first contact	„	8 58 7·7	9 3	„
		„ last contact		9 1 27·2		
	I.	Sh. tr. ingr. first app.	„	9 56 0·7	9 58	„
		„ last contact		9 57 0·5		
	I.	Tr. egr. first app.	„	11 14 50·7	11 23	„
		„ last contact		11 20 59·7		
	III.	Occ. reap. first app.	„	11 18 50·1	11 28	„
		„ last contact		11 25 38·9		
	III.	Ecl. dis. commencement	„	11 27 38·6	11 32 1·6	„
		„ total dis.		11 27 58·6		
	I.	Sh. tr. egr. first contact	„	12 4 17·6	12 18	„
		„ last contact		12 5 27·4		
29	I.	Ecl. reap. first seen	„	9 18 44·0	9 23 58·2	K
		„ full brightness		9 21 16·6		
	II.	Occ. dis. first contact	„	13 0 26·2	13 9	„
		„ bisection		13 2 40·9		
		„ last contact		13 4 55·5		
31	II.	Tr. egr. first app.	„	10 3 10·3	10 9	„
		„ bisection		10 4 55·0		
		„ last contact		10 7 54·5		
Apr. 5	I.	Ecl. reap. first seen	„	11 14 33·0	11 18 41·1	L
7	II.	Tr. ingr. first contact	Heliom^{r} with power 200	9 35 55·8	9 40	K
		„ bisection		9 38 10·4		
		„ last contact		9 40 25·0		
	II.	Tr. ingr. first contact	10-ft. tel. with power 80	9 35 38·1	9 40	L
		„ bisection		9 38 7·7		
		„ last contact		9 41 7·2		
8	III.	Sh. egr. first contact	„	8 44 23·6	9 2	„
		„ last contact		8 48 57·8		
9	II.	Ecl. reap. first seen	Heliom^{r} with power 200	9 41 7·3	9 47 20·8	M
		„ full brightness		9 43 30·9		

Day of Obs. 1871.	Satellite.	Phenomena.	Instrument and Power used.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
Apr. 7	II.	Ecl. reap. first seen	10-ft. tel. with power 80	9 42 2·5	9 47 20·8	K
		„ full brightness		9 45 6·5		
19	I.	Occ. dis. first contact	„	11 32 58·9	11 40	„
		„ bisection		11 34 58·6		
		„ last contact		11 36 58·3		
20	I.	Tr. ing. first contact	Heliom^r with power 200	8 53 20·5	9 0	M
		„ bisection		8 54 45·3		
		„ last contact		8 58 20·2		
	I.	„ first contact	10-ft. tel. with power 80	8 53 31·8	9 0	K
		„ bisection		8 56 31·3		
		„ last contact		8 59 0·9		
	I.	Tr. egr. first app.	Heliom^r with power 200	11 13 22·5	11 20	M
		„ bisection		11 15 32·2		
		„ last contact		11 17 51·8		
	IV.	Occ. reap. first app.	„	11 33 19·2	11 40	„
		„ last contact		11 39 48·2		
21	I.	Ecl. reap. first seen	„	9 31 57·7	9 37 4·9	„
		„ full brightness		9 33 22·5		
	II.	„ first seen	10-ft. tel. with power 80	9 31 52·7	9 37 4·9	K
		„ full brightness		9 34 2·4		
23	II.	Occ. dis. first contact	Heliom^r with power 200	9 35 3·7	9 43	M
		„ last contact		9 39 18·0		
	II.	„ first contact	10-ft. tel. with power 80	9 34 46·2	9 43	K
		„ last contact		9 39 45·4		
29	III.	Tr. ing. first contact	„	12 4 10·1	12 16	L
		„ last contact		12 16 8·1		
May 3	III.	Ecl. reap. first seen	10-ft. tel. with power 150	10 53 24·0	10 58 18·1	„
		„ fully seen		10 54 43·8		
		„ full brightness		10 55 53·6		
6	I.	Tr. egr. first contact	„	9 27 8·9	9 34	„
		„ last contact		9 30 58·3		
9	II.	Tr. ing. first contact	10-ft. tel. with power 200	8 51 4·4	8 57	„
		„ bisection		8 54 3·9		
		„ last contact		8 57 58·2		
13	I.	Tr. ing. first contact	„	9 4 14·1	9 9	„
		„ bisection		9 5 48·8		
		„ last contact		9 8 18·4		
	I.	Sh. ingr. first contact	„	10 21 10·4	10 26	L
		„ last contact		10 24 8·8		
24	IV.	Ecl. reap. first seen	Heliom^r with power 200	10 43 11·1	10 48 10·4	K
		„ full brightness		10 52 49·5		

Day of Obs. 1871.	Satellite.	Phenomena.	Instrument and Power used.	Oxford Mean Solar Time of Observation. h m s	Greenwich Mean Solar Time from N. A. h m s	Observer.
May 28	I.	Occ. dis. first contact	Heliom^{r} with power 200	10 10 23·9	10 9	K
		„ bisection		10 12 33·5		
		„ last contact		10 15 3·1		
June 6	I.	Ecl. reap. first seen	„	10 0 27·6	10 5 5·5	L

Notes.

1871, Feb. 13. J. III. occ. dis. The time of first contact is considered accurate. Clouds interfered with the other phases. Very cloudy at reappearance.

20. J. III. occ. dis. Very tremulous; cloudy at last contact.

Mar. 22. J. I. ecl. reap. The satellite attained its full brightness, 2½ minutes after first reappearance.

1873, Jan. 25. J. I. trs. ingr. A good observation; the planet and satellites well defined and steady.

April 5. The full brightness could not be satisfactorily estimated, owing to cloud.

Apr. 8. The phenomenon occurred some minutes before the time in the *Nautical Almanac*. The observation of first contact tolerably satisfactory; that of the last contact not so.

9. At the time recorded, only a suspicion of the reappearance, which proved to be correct. (M.)

20. The sky was splendid, but the images were very unsteady. (M.)

23. Cloudy.

29. The sky was splendid; the satellite seemed to disappear and reappear several times before the time noted for the last contact.

May 3. The planet was beautifully defined with the power used (150).

June 6. Too hazy to determine the time of full brightness.

The initials M., L., and K., are those of Mr. Main, Mr. Lucas, and Mr. Keating.

The observations of the satellites for the year 1872 will be found in No. 8 of vol. xxxii. of the *Monthly Notices*.

Proposal to determine the Solar Parallax by Observations of Flora. By Dr. Galle.

(*Translated from a Letter to Mr. Hind, dated Breslau, 1873, May 28.*)

Last year I make a proposal to astronomers provided with large telescopes to endeavour to determine the solar parallax by means of the small planets which came nearest to the Earth. I do not know whether you noticed the paper (*Ast. Nach.* vol. lxxx. p. 1) in which this suggestion was made, which consisted in measuring, with a wire-micrometer of an equatoreal differences of declination with Northern and Southern stars situated near the planets at observatories in the Northern and Southern hemispheres; with special reference at that time to last year's opposition of *Phocæa*.